stations, in noways represents the true conditions on the lake surfaces during windy weather. The lake surface is increased to a considerable extent by wave action and the contact with constantly changing air and spray blown from waves make conditions which almost render the problem indeterminate.

Mr. Wisner adds:

The run off above given is that which, from a personal knowledge of the country, seems reasonable to me. The discharge of the St. Marys, 72,600, is, I think, very nearly correct. The discharge of the St. Clair River for mean conditions does not, in my opinion, exceed 200,000 cubic feet per second. In this connection I wish to call attention to the fact that the discharge of Lake Huron depends on both the stage in Lake Huron and in Lake St. Clair. Owing to the fluctuation of Lake Erie being greater than for Lake Huron, the minimum slope of the St. Clair River occurs at the high stage of the lakes, and the maximum slope at the minimum stage, a condition which has not been heretofore considered, and which plays an important part in the fluctuations of both lakes. The St. Clair River is only 750 feet wide at its head, and a large part of any change of slope is concentrated in the rapid at the foot of Lake Huron, which simply means that the maximum discharge is not necessarily at the maximum stage of Lake Huron.

We are now making additional observations for the discharge of Niagara River at a higher stage than when observations were made last fall, which may change the result obtained then.

I feel quite confident now that the discharge for mean stage will likely fall between 230,000 and 240,000 cubic feet.

OCEANIC AND SEISMIC NOISES.

The following extract from the English journal, Nature, for June 9, 1898, Vol. LVIII, page 130, is of interest in connection with the article on page 152 of the MONTHLY WEATHER REVIEW for April which was published almost simultaneously, and without knowledge of the Italian article referred to by our contemporary:

The mysterious phenomenon known as "Barisal guns," or "Mist poeffers," forms the subject of a useful paper by Dr. A. Cancani, in the last Bollettino, Vol. III, No. 9, of the Italian Seismological Society. The observations on which his discussion is founded are collected from places in or near the inland province of Umbria, where the noises are known as "marina," it being the popular belief that they come from the sea. The sound is quite distinct and easily recognized; it is longer than that of a cannon shot, and though more prolonged and dull, it is not unlike distant thunder. It invariably seems to come from a distance, and from the neighborhood of the horizon, sometimes apparently from the ground, but generally through the air. The weather, when the "marina" is heard, is calm as a rule, but that it often precedes bad weather is shown by the common saying, "Cuando tuona la marina o acqualo vento o strina" (when the ocean thunders, expect rain or wind or heat). The interval between successive detonations is very variable, sometimes being only a few minutes or even seconds. They appear to be heard at all times of the day and year, the experience of observers differing widely as to the epochs when they are heard most frequently. With regard to the origin of the "marina," Dr. Cancani concludes that they can not be due to a stormy sea, because "mist-poeffers" are frequently observed when the sea is calm; not to gusts of wind in mountain gorges, for they are heard on mountain summits and in open plains. If their origin were atmospheric they would not be confined to special regions. Nor can they be connected with artificial noises, for they are heard by night as well as by day, and in countries where the use of explosives are unknown. There remains thus the hypothesis which Dr. Cancani considers the most probable, that of an endogenous origin. To the obvious objections that there should always be a center of maximum intensity, which is never to be found, and that they are so rarely accompanied by any perceptible tremor, he replies that, in a seismic series, noises are frequently heard without any shock being felt, and of which we are unable to determine the center.

ELECTRICAL STORMS IN KANSAS.

Mr. T. B. Jennings, Section Director of the Kansas Section of the Climate and Crop Service, reports that—

The western counties of that State are occasionally swept by a windstorm, denominated by the plainsmen as an "Electrical storm," though no thunder or lightning occurs and the weather is generally clear; it is a broad wind, blowing with great force; a person exposed to it soon becomes filled with electricity, and on approaching a stove electric sparks will pass from his hands to the stove; the housewife wraps her hands up in rags to handle the stove utensils. It is difficult to realize the conditions in such a windstorm until one experiences them; the electrical conditions are not uniform but confined more to currents or streaks; growing grain and foliage on trees exposed to these conditions become more or less scorched, and sometimes the grain crop is completely killed. Such winds (electric storm) are most frequently from the northwest.

The mountains of Colorado, and doubtless other parts of the country, frequently experience electrical storms that appear to be very similar to those described by Mr. Jennings. The wind blows severely from the west; the air is sometimes quite dry but more often filled with the finest forms of vapor condensation; a steady stream of electrical discharges flows from every sharp point, whether of rock, or plant, or dwelling; the observer feels a tingling and cooling sensation, precisely similar to that experienced when taking an electrical bath treatment, and hears the singing due to the thousands of discharges going on all around him. Occasionally our observers on Pikes Peak have had too intense an experience; flashes and balls of lightning have played all around them within the observing station and the iron stove has been ablaze with continuous electrical discharges, yet nothing serious occurred. On a neighboring summit the field party sent out by the Coast and Geodetic Survey, in 1893, (?) reported far more serious storms of several hours' duration on successive days, entirely preventing work and injuring the instruments.

It is not yet satisfactorily ascertained whether the electricity of such storms originates in the earth or in the atmosphere or in the space beyond. If the latter, then we may trace it to the sun; if it comes from the air, we must attribute the origin of the electricity to some peculiarity in the processes of evaporation and condensation; if it comes from the earth, then it must originate in the compressions and shocks and friction that attend earthquakes and the outflow of lava. We do not see our way clear to indorse the popular idea that the electricity is generated by the wind or by the friction of particles rolled along by the wind, or by the melting of snow crystals, as suggested by Mr. Couch. In fact, the problem is evidently too difficult for our present limited knowledge.

The first step to be taken in investigating the true nature of these electric storms must consist in a collection of data showing the places and dates of their occurrence, and the collection must be sufficiently exhaustive to show when and where they do not occur as well as where they do. It is also necessary to distinguish between the injury done to plants by electricity and that done by the drought and the evaporation that accompany hot, dry winds in Kansas and the western plains. Reports of the occurrence of these storms will be very acceptable. A graphic account of the storm of October 27, 1894, is given on p. 120, American Meteorological Journal, Vol. XII, August, 1895.

METEOROLOGICAL SUPERSTITIONS.

The tendency of mankind to regard any unusual meteorological phenomenon as a special message from on high, announcing the speedy occurrence of some event of importance either to the individual or to the whole human race, is well illustrated by a note in the April report of Mr. Earl Flint, at Rivas, Nicaragua. With reference to the halo recorded by him on April 26, he says: "Many called my attention to the halo as they saw three extra suns. Last year for a similar occurrence at St. George the town was called out, believing it a forerunner of some calamity; but here at Rivas, they made it the precursor of the earthquake."

An inclosed slip from the Managua Daily gives a long series of connections between halos and both good and bad events in the history of the world. Of course, any one familiar with chronological tables could pick out a thousand more such coincidences without demonstrating any connection between halos and the history of the human race further than the general principle that remarkable events are continually occurring both in the heavens and on the earth, and that an